

June 6, 1893.

Sir W. H. FLOWER, K.C.B., LL.D., F.R.S., President, in the  
Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of May 1893:—

The total number of registered additions to the Society's Menagerie during the month of May was 165, of which 61 were by presentation, 8 by birth, 54 by purchase, 2 by exchange, and 40 on deposit. The total number of departures during the same period, by death and removals, was 104.

Amongst the additions I may invite special attention to the following:—

A young female Water-buck (*Cobus ellipsiprymnus*), born in the Menagerie May 4, 1893, being, so far as is known, the first Antelope of this species that has been bred in captivity.

For our pair of this beautiful species we are indebted to the liberality of Mr. G. S. Mackenzie, F.Z.S. The male was received June 30, 1890 (see P. Z. S. 1890, p. 589), and the female on May 26, 1891 (see P. Z. S. 1891, p. 326). Both of these animals were obtained in the territory of the British East African Company, where the species appears to be abundant (see Willoughby's 'East Africa and its Big Game,' page 288).

I exhibit a water-colour drawing by Smit (Plate XXXIX.) of this interesting young animal, which generally resembles the adult, though perhaps rather more rufous in colour.

The Council have resolved to present to Mr. G. S. Mackenzie the Silver Medal of the Society in recognition of this successful addition to the list of acclimatizable Antelopes.

The Hon. Walter Rothschild, F.Z.S., exhibited and made remarks upon the following objects:—

1. A specimen of the egg of the Duck-bill (*Ornithorhynchus anatinus*), stated to have been taken out of the pouch of the mother in Queensland.

2. The leg-bones of a large species of *Aepyornis* from South-western Madagascar, together with a perfect egg of the same extinct bird.

3. An enlarged photograph, by Mr. Williams of Honolulu, representing an enormous colony of Albatrosses on Laysan Island, in the North Pacific. The Albatross portrayed was the new species, *Diomedea immutabilis*, lately described by Mr. Rothschild, Bull. B. O. C. no. ix p. xlviii. The breeding-colony of this species was stated to occupy an area of nearly four square miles in Laysan Island. Another area of about two square miles in the same island was occupied by *Diomedea brachyura*.

4. A series of Lepidoptera from Jamaica, with their accompany-

ing larvæ. They were remarkable for their good preservation and excellent mounting.

5. A series of Diurnal Lepidoptera obtained by Herr Garlepp at a height of 17,000 feet on the Bolivian Andes.

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Mr. Sclater exhibited some skins of Mammals obtained by Mr. H. H. Johnston, C.B., F.Z.S., Lieut. B. L. Sclater, R.E., Messrs. Buchanan, Bros., and Mr. A. Whyte, F.Z.S., in the Shiré Highlands, British Central African Protectorate, and made the following remarks:—

1. *CERCOPITHECUS ALBIGULARIS*.

Two flat skins of this Monkey obtained by Mr. B. L. Sclater from the natives near Blantyre, where the species was said to be common. We have also received several living examples of this species from Mombasa<sup>1</sup>, and Mr. True has recorded its occurrence in the Kilimanjaro District (see my remarks above, p. 251). It is therefore certainly an East-African species, and I can hardly believe that the specimens from the Gold Coast referred to this species by Schlegel (*Mus. des Pays-Bas*, vii. p. 79) and Jentink (*op. cit.* xi. p. 20) can have been correctly determined.

2. *HIPPOTRAGUS NIGER*.

A flat skin of an adult specimen of the Sable Antelope, which Mr. Johnston writes to me (Zomba, July 29, 1892) was shot in the plain between Zomba and Lake Shirwa.

My son also has brought home a fine head of this Antelope, which was obtained on the Portuguese bank of the Ruu, opposite Zoa. He also met with it in the plains between Zomba and Milanji, at an altitude of about 1800 feet.

3. *BUBALIS LICHTENSTEINI*.

The Hartebeest, my son tells me, is found all over the Shiré Highlands, and is very abundant in some localities. It frequents the open grassy plains at all altitudes. It is often to be seen in company with the Zebra (*Equus burchelli*). I exhibit the head of an adult male.

4. *COBUS ELLIPSIPRYMNUS*.

This Antelope, of which I exhibit several heads, is, as my son tells me, the most numerous of the tribe on all the lower plains. It is very abundant in the Elephant-Marsh between Chiromo and Katunga, and often ascends the lower hills. It is also common on the Upper Shiré, and on the Shirwa and Tochila plains, generally not far from water, but does not usually penetrate the higher hills.

<sup>1</sup> One from Mr. T. E. C. Remington, of Mombasa, received May 20, 1893, and others previously.



1.

a



2.

b



3.



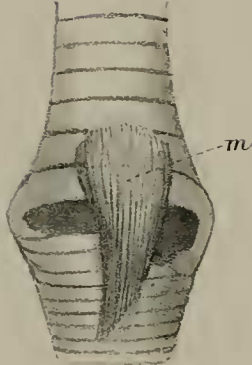
4.

a

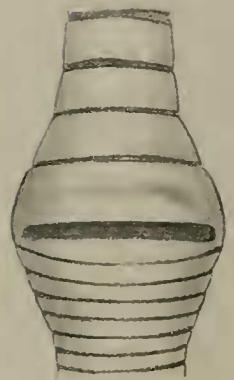


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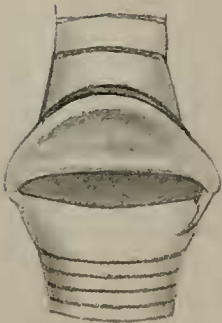
b



6.



7.



8.



9.



5. *CONNOCHÆTES TAURINA*.

The Gnu is stated by the natives to have been formerly plentiful on the plains between Milanji and Zomba. It is now very scarce, but Mr. B. L. Selater saw it once on the Tochila plains, and obtained a tail of it from the natives in that district.

6. *TRAGELAPHUS SCRIPTUS ROUALEYNI*.

Three flat skins of this Bush-bok belonging to the subspecies, as described by Mr. Thomas, P. Z. S. 1891, p. 389.

My son informs me that this is one of the commonest Antelopes in the Shiré Highlands, being found in all parts of the country. It is excellent eating.

7. *TRAGELAPHUS ANGASI*.

A flat skin of a female of this species obtained on the Moanza River, Lower Shiré, and presented to Mr. Johnston by Messrs. Buchanan, Bros.

I have already recorded the occurrence of this Antelope on the Moanza, from a skin procured by Mr. Sharpe (see P. Z. S. 1892, p. 98), but it is interesting to have confirmation of it.

Mr. B. L. Selater, who was on the Moanza in September 1892, learned that the females of this Antelope (the "Bō" of the natives) congregate in large herds on the hilly country to the south of the river, while the males go about singly and are not easily met with.

8. *TAUROTRAGUS OREAS LIVINGSTONII*.

The Striped Eland, my son tells me, is still common all over Southern Nyasaland, occurring in small herds of from 4 to 8, principally in the hills, but descending to the rivers to drink at early morning and evening. I exhibit two imperfect skins of it, which, like all those observed, are distinctly striped on the neck and withers.

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The following papers were read:—

1. On certain Points in the Anatomy of Parrots bearing on their Classification. By FRANK E. BEDDARD, M.A., F.R.S., and F. G. PARSONS, F.R.C.S.

[Received June 6, 1893.]

(Plate XL.)

In the present paper we desire to direct the attention of the Society to certain points in the structure of the Parrots to which either little or no attention was paid by Garrod in his well-known essay on the systematic arrangement of this group<sup>1</sup>. Garrod

<sup>1</sup> P. Z. S. 1874, p. 586.

studied chiefly the ambiens muscle, the carotids, the gall-bladder, and the condition of the oil-gland; with the help of the variations afforded by the structures he propounded a scheme of classification of the group differing in many important particulars from the classifications in use before: he did not discuss, in the paper to which we now refer, the relations of the Parrots to other groups of birds; in this respect we shall follow his example and confine ourselves to an attempt to indicate affinities between different members of the group in the light of the facts which we record here for the first time. We prefer, however, rather to lay stress upon the new anatomical facts than to insist too much upon the accuracy of the grouping of the birds to which they appear to lead. It is very remarkable that Garrod should in this particular case have ignored the characters afforded by the syrinx, an organ which he was very fond of studying and using as a help to decide vexed questions of affinity: thanks chiefly to his interest in this organ we have been able to examine a very large series of syringes of many of the principal genera, which he collected together during his tenure of the Prosectorship of this Society; to these a few were doubtless added by Forbes, and we have carefully preserved those of such birds as happened to die during the course of the present research; so that on the whole we can claim to have seen a fair number of illustrative genera; the organ, too, in our opinion shows useful, because easily definable, characters for systematic purposes. We shall commence by giving some account of the syrinx in a number of illustrative genera.

### § *Syrinx*.

The syrinx of the Psittaci seems to show two main varieties.

*a*. In the following species there is a syrinx of the type which is illustrated in Plate XL. figs. 4, 5 (*Cacatua cristata*):—

*Cacatua cristata*.

— *triton*.

— *philippinarum*.

*Microglossa aterrima*.

*Calyptrorhynchus banksi*.

*Stringops habroptilus*.

The syrinx is in these species remarkable for the fact that the first semirings of the bronchi are weak and cartilaginous and are usually separated from each other by considerable tracts of membrane. *Cacatua* itself represents the most extreme type; in *Cacatua cristata*, for example (see Plate XL. fig. 4), when the syrinx is seen on a lateral view the membrane occupies a great deal of the outer lateral region of the commencement of the bronchus.

The figure to which we have just referred exhibits the syrinx with the intrinsic muscles cleaned away, but the point of attachment of the muscle is indicated by the circle (*a* in the figure); it will be seen from an inspection of that figure that the semirings of

the bronchus are at first very small and do not extend across the side of the bronchus; they gradually increase in length, until at the sixth or seventh they come to extend right across the syrinx. In *Microglossa aterrima* the syrinx is in certain respects less abnormal; the rings are still feeble, but on a lateral view of the organ they extend completely across, and there is on such a view no bare tract of membrane such as we have figured in *Cacatua*.

*Calyptrorhynchus banksi* is intermediate between the two extremes; the first semiring only is incomplete, inasmuch as it does not reach from one side of the syrinx to the other—or rather we should say from the anterior to the posterior side.

*Stringops habroptilus* (fig. 3) has the same weak cartilaginous bronchial semirings; but on a lateral view of the syrinx they are seen to extend right across.

b. The second group contains, so far as we can say from first-hand knowledge, the following genera:—

<i>Chrysotis.</i>	<i>Tanygnathus.</i>
<i>Pyrrhulopsis.</i>	<i>Eos.</i>
<i>Trichoglossus.</i>	<i>Polyteles.</i>
<i>Lorius.</i>	<i>Platycercus.</i>
<i>Pionus.</i>	<i>Pæocephalus.</i>
<i>Psittacus.</i>	

These genera, of several of which we have examined more than one species, are differentiated from those of the first division by the fact that the bronchial semirings are as a rule ossified and are frequently more or less fused together; at the same time the first ring is commonly concave upwards, whereas in the Parrots of the first mentioned group the bronchial semirings are straight.

The most extreme type is perhaps offered by *Chrysotis*; of this genus we have seen the following species:—

<i>Chrysotis versicolor.</i>
— <i>erythrura.</i>
— <i>leucocephala.</i>
— <i>bodin.</i>
— <i>viridigenalis.</i>
— <i>levaillanti.</i>

In all these species (Plate XL. fig. 7) the first two rings of the bronchus are closely fused together and form a bowed piece of bone forming with the last tracheal ring a semicircular outline; the space between the two is of course occupied by membrane. In *Chrysotis levaillanti* for instance, and there is no great difference in the other species, the double character of the apparently single first bronchial semiring is only to be seen at the two ends. In a number of other Parrots the first bronchial semiring is larger than that which follows though not fused with it; this is the case with *Trichoglossus*, *Pyrrhulopsis*, and *Chalcopsitta*; the genera *Eos* (figs. 1, 2), *Polyteles*, *Platycercus*, and *Tanygnathus* have syringes which are constructed on the same plan. In *Conurus* there is a

little difference; here the first two rings of the bronchus are equi-sized; this at any rate applies to the two species *Conurus aureus* and *Conurus cruentatus*, which are the only two that we have examined from this point of view. The genus *Ara* (species *Ara leari* (fig. 6), *Ara militaris*) agrees with *Conurus*. *Psittacus* (fig. 8) is like these genera; but *Pionus* (fig. 9) agrees more closely with *Chrysotis*.

It will be obvious from what we have said and from the illustrations of the syrinx which accompany this paper that no hard-and-fast line can really be drawn between the two groups into which we divide the Parrots; if it were thought desirable to draw such a line it would be between the genus *Cacatua* on the one hand and all the remaining Parrots on the other. *Cacatua* alone has a syrinx in which the first bronchial semirings are incomplete leaving a bare tract laterally which is easily visible when the syrinx is viewed from the side; but in this genus there is another peculiarity which we have not yet referred to—the intrinsic muscle of the syrinx (fig. 5, *m*) ends in a very narrow point which passes into a fine tendon of attachment; in *Chrysotis*, *Eos* (fig. 2, *m*), &c., the muscle is comparatively broad down to its actual attachment. In this particular *Microglossa* and *Stringops* agree with *Cacatua*, although they do not show the incomplete rings that have been mentioned as characteristic of the latter genus. These genera in fact are to this extent intermediate between *Cacatua* and the more normal (at any rate more usual) form of syrinx in the Parrots; the rings are still, however, soft and cartilaginous, thus different from *Conurus*, which is a further step in the direction of *Chrysotis*; *Chrysotis* seems to represent the opposite extreme to *Cacatua*. *Ara* is a genus which is also intermediate in the characters of its syrinx, it has weakish and straight rings, as in *Stringops* for instance; but the muscles are as in the second group of Parrots, and the general aspect of the syrinx is more in accord with this placing of it.

#### § *Myology.*

We find that the Parrots are very much alike in their myology; there are, however, a few points in which they show differences and which may be useful for the purposes of classification. In the first place, the arrangement of the tendons of the tensor patagii varies considerably. Speaking generally (see Fürbringer, *Morph. v. Syst. d. Vögel*, Taf. xxii. figs. 4, 5, 6: *Sittace*, *Psittacus*, *Cacatua*) this muscle ends in a broad aponeurosis which lies between the two layers of skin of the patagium, and in this aponeurosis are three thickened bands which run down to the forearm to join the tendon of the extensor longus at right angles; from the lower margin of this transverse tendon another slip runs down to the ulna, having the same course as the patagial tendons, but not being necessarily in the same line with any of them. The anterior patagial tendon usually curves forwards near its lower attachment and the posterior slightly backwards; in addition to this the

anterior and middle tendons are usually fused in the upper part of their course.

Another point which we noticed about the tensor patagii was that in some cases it completely covered the posterior deltoid muscle and in others left it more or less exposed.

In addition to the amount of exposure of the posterior part of the deltoid, we found that the two parts of that muscle varied in their relative sizes to one another.

The last point that we noticed in the myology of the arm was the presence or absence of the lower head of the anconeus; when this was found it was attached to the shaft of the humerus either in front of or very slightly above the insertion of the latissimus dorsi and altogether below the tubercle for the attachment of the pectoralis minor.

The lower head of the anconeus is present in the following six genera—*Cacatua*, *Nestor*, *Stringops*, *Pyrrhulopsis*, *Ara*, and *Calyptorhynchus*; while in the following twenty-one it is absent—*Chrysotis*, *Deroptus*, *Psittacula*, *Aprosmictus*, *Pæocephalus*, *Caica*, *Tanygnathus*, *Eos*, *Eclectus*, *Lathamus*, *Palæornis*, *Loriculus*, *Psephotus*, *Lorius*, *Conurus*, *Coracopsis*, *Cyanorhamphus*, *Pionopsitta*, *Bolborhynchus*, *Platycercus*, and *Psittacus*.

In all the genera in which we have found a lower head to the anconeus, the posterior deltoid was only partially covered by the posterior edge of the tensor patagii; while among those in which the lower head was not found, the deltoid was completely covered, with the following exceptions—*Eclectus*, *Coracopsis*, *Pionopsitta*, and *Bolborhynchus*. In the latter, however, the muscle only just appeared behind the edge of the tensor patagii. In the five genera in which the lower head of the anconeus was found, the posterior deltoid was larger than the anterior with the exception of *Pyrrhulopsis*, in which also the lower head of the anconeus was but slightly marked.

In the genera in which no lower head was found to the anconeus the rule seems to be that the anterior deltoid is larger than the posterior; the following are exceptions:—*Coracopsis*, in which the posterior is the larger; and *Pæocephalus*, *Eclectus*, and *Bolborhynchus*, in which the two deltoids are of equal size.

The arrangement of the tendons of the tensor patagii is very much the same in *Nestor*, *Stringops*, and *Calyptorhynchus*; in all three the tendons are relatively very long when compared with the fleshy part of the muscle, and they are all close to one another, so as to give the appearance in *Stringops* of one tendon. In *Calyptorhynchus* the anterior tendon leaves the others in the lower part of the patagium and runs forwards after its usual fashion, so that the main distinctive point of these three genera, as far as the tensor patagii goes, is that the middle and posterior tendons are close together. In *Coracopsis* these tendons are separated by a slight interval, but closely correspond to the arrangement in the birds last named.

*Eos*, *Lorius*, *Pæocephalus*, and *Caica* have a characteristic and

almost uniform arrangement of the patagial tendons. In them the three tendons are very difficult to distinguish because the fibrous membrane between them, of which they are only specialized parts, is as thick as they are. The result is that in these birds the patagial muscle seems to be inserted by a broad, short, membranous-looking tendon.

*Conurus* shows a transitional stage between these last genera and the typical arrangement; the three tendons are more distinct, but they are equally short and show the same mode of attachment to the fleshy part of the muscle.

*Lathamus* is remarkable for having the anterior tendon separate in its whole length from the middle one, instead of being fused with it in the upper part of its course.

*Chrysotis* and *Bolborhynchus* have a small extra tendon between the middle and posterior ones; in *C. guildingi* this was only present on one side, but in *C. leucocephala* it was found on both.

*Psittacus* has three tendons which are completely separate in the whole of their course, and in this respect it corresponds to *Lathamus*. We are, however, inclined to look upon the anterior tendon as representing the fused anterior and middle tendons of *Lathamus*, and to regard the middle tendon as an extra one as in *Chrysotis*. Our reasons for this are that there is a considerable interval between the two tendons, and that they do not diverge as in all other cases. If this view is correct, the patagial tendons of *Psittacus* closely resemble those of *Chrysotis*, while they also agree in having the anterior deltoid larger than the posterior, in the absence of a lower head to the anconeus, and in having the deltoid completely covered by the tensor patagii.

*Tibialis anticus*.—The tibialis anticus in almost all the genera which we examined was inserted by a single tendon except in *Chrysotis* (of which two species were examined), where this tendon was double. The only genus which resembled *Chrysotis* was *Psittacus*, in which the tendon was really double; but the two parts, although easily separable, were slightly connected together. In several other genera we detected a slight line of demarcation in the tendon, but it was not sufficiently definite for us to regard it as of any classificatory value.

*Peroneals*.—The peroneus longus and brevis are, as far as we have observed, always present in Parrots, but the origin of the former differs somewhat in different genera.

In *Stringops* and *Nestor* the peroneus longus rises from the front of the bony fibula and its membranous continuation for about the upper half of the leg. The muscular belly overlaps that of the peroneus brevis very much near its origin, and the muscle is large and well marked.

In *Chrysotis*, on the other hand, the peroneus longus is very small and only rises from the membranous continuation of the fibula in the lower part of the leg; it is so small that it does not overlap the peroneus brevis at all but lies behind it.

Gadow<sup>1</sup> describes the peroneus longus as apparently absent in *Chrysotis*.

In the other genera examined the muscle is intermediate between *Stringops* and *Chrysotis*; it rises from about the middle third of the leg as high as the tip of the bony fibula, and only slightly overlaps the peroneus brevis. The insertion of the peroneus longus is always into a strong fibro-cartilaginous ring which surrounds the deep flexor tendons opposite the ankle-joint and is attached to the base of the tarso-metatarsus.

The peroneus brevis varies very little; it rises from the outer surface of the tibio-tarsus, and is inserted into the outer part of the posterior surface of the base of the tarso-metatarsus. In *Chrysotis*, where the peroneus longus is so small, it is larger than usual.

We do not propose to produce as a result of the above notes a complete scheme of classification of the *Psittaci*: in the first place we have been unable to see a good many types which ought to be studied before a general scheme should be propounded; and in the second place we have only called attention to certain points in the anatomy of the group. It may, however, be pointed out that the material which we have gathered together in this paper, combined with what we know through the researches of the late Professor Garrod, bring up our knowledge of the anatomy of the Parrots to a higher level than that of many other groups of birds; the facts accumulated in the papers referred to will at any rate serve some one who can supplement them by the observation of other genera with a mass of information upon which a definite scheme can be made out. In the meantime, however, we may indicate a few questions of affinity as to which our investigations appear to throw some light. In the first place, there is the remarkable genus *Stringops*: there is no doubt that its purely terrestrial habits have led to some degeneration; it has, for example, a flat sternum; but degeneration of this kind would hardly be expected to affect such organs as are treated of here with the exception, of course, of the muscles of the patagium. It is perhaps a noteworthy point that on the whole the musculature of the arm as far as we have studied it is like that of *Nestor*, a Parrot which of course occurs in the same part of the world; the agreement as to these muscles also extends to *Calyptorhynchus*, in which genus the syrinx also is fashioned after the plan characteristic of *Stringops*: this is also of importance; these two genera are, from our point of view, the nearest allies of *Stringops*, which does not, in so far as the facts treated of here have weight, occupy nearly so isolated a position in the system as has been assigned to it by others<sup>2</sup>.

To a great extent, therefore, our results bear out Prof. Garrod's

<sup>1</sup> Bronn's Klassen u. Ordn. d. Thierreichs, Aves, p. 18.

<sup>2</sup> *E. g.* in Mr. Slater's classification used in the "List of Animals." Fürbringer (J. f. O. (4) xxxvii. p. 241) puts *Stringops* down as a primitive, if not the most primitive, Parrot.

views upon the position of *Stringops*. He regards it, it is true, as a member of a subfamily (*Stringopinæ*) distinct from the *Cacatuinæ*; but both these subfamilies are within one family, *Palæornithidæ*. We quite agree with Prof. Garrod's remark about *Stringops* (P. Z. S. 1874, p. 596) that "as a Parrot it is not so strikingly peculiar as many seem to think. Its wings are useless, and the carina sterni is correspondingly reduced, it is true; but as points of classificational importance, I regard these as insignificant."

The association of *Cacatua* with *Microglossa* and *Calyptorhynchus* is confirmed, though *Cacatua* is perhaps farther off either of these two than they are from each other.

*Ara*, too, we find to be rather nearer than some have thought it to certain of the Old World genera, such as *Nestor*, *Stringops*, and *Calyptorhynchus*. Considering the superficial resemblance which the Macaws bear to the Cockatoos, this result is of not a little interest.

#### EXPLANATION OF PLATE XL.

##### SYRINGES OF PARROTS.

- |           |                                |
|-----------|--------------------------------|
| Fig. 1. } | <i>Eos reticulata</i> .        |
| 2. }      |                                |
| 3. }      | <i>Stringops habroptilus</i> . |
| 4. }      |                                |
| 5. }      | <i>Cacatua cristata</i> .      |
| 6. }      | <i>Ara leari</i> .             |
| 7. }      | <i>Chrysotis erythrura</i> .   |
| 8. }      | <i>Psittacus temneh</i> .      |
| 9. }      | <i>Pionus violaceus</i> .      |

In figs. 2 & 3 only the intrinsic muscle (*m*) is shown.

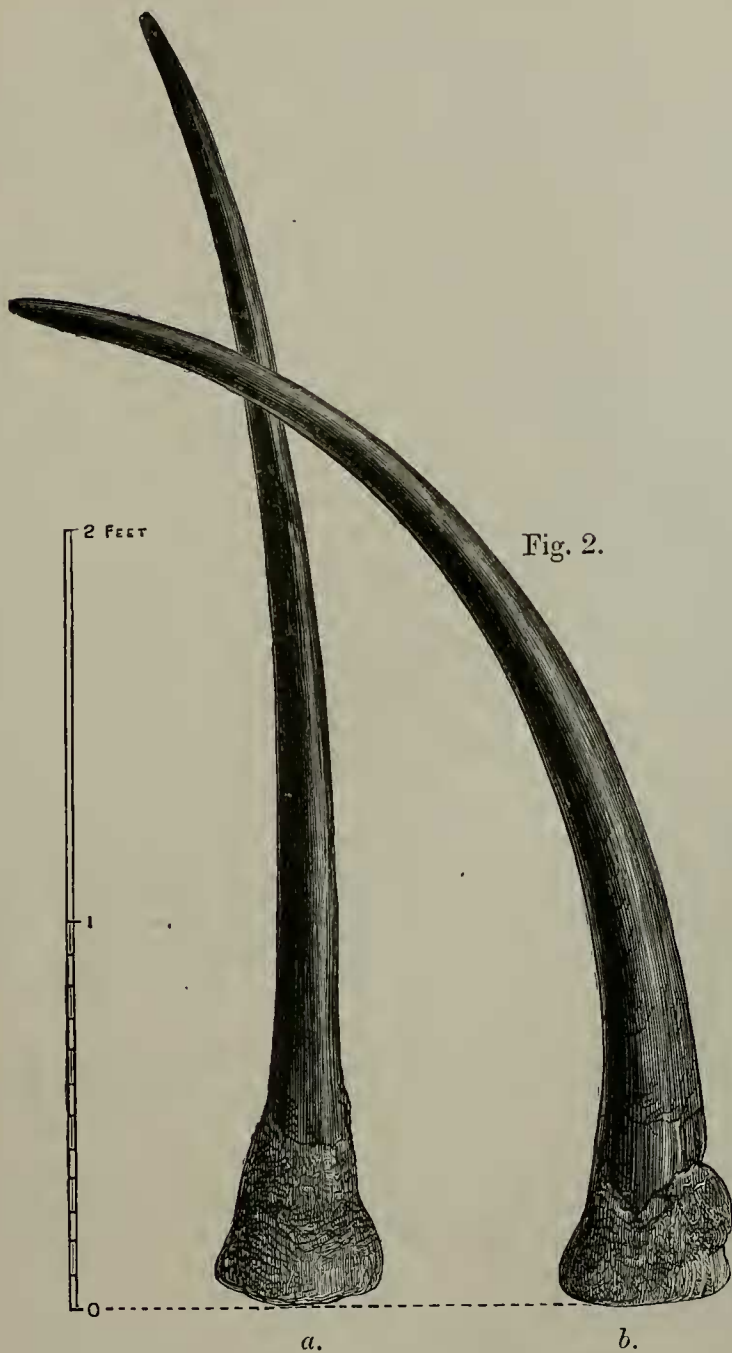
2. On some Horns belonging, apparently, to a new Form of African Rhinoceros. By P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received June 2, 1893.]

My friend Mr. Frederick Holmwood, C.B., C.M.Z.S., H.B.M. Consul-General at Smyrna, has kindly lent me for examination two very remarkable horns of an African Rhinoceros, which he obtained at Zanzibar, when Consul-General there a few years ago. Mr. Holmwood gives me the following account of them:—

"From a very careful description of the country I gathered that they came from the country of 'Udulia,' situated at the N.E. point of Usukuma, 50 miles S. of Speke Gulf. The native traveller whom I bought them of thought, however, that the district, which is a jungle interspersed with grassy plains, might form part of the large pastoral country to the W. of Udulia, called by various names, but known generally by caravans as 'Uturu.' He said it was the only district where this Rhinoceros was known. It is only inhabited by hunters whom he described as dwarfs, but I do not take this for granted."

Fig. 1.



Front horns of Holmwood's Rhinoceros.

The question is to what species of *Rhinoceros* these two horns (which I now exhibit) are to be referred. It will be seen that they are remarkable for their length, thinness, and especially for their comparative roundness and their small size at the base.

1881  
Since the publication of Mr. F. C. Selous's excellent paper on the African Rhinoceroses (P. Z. S. 1871, p. 725), it has been generally agreed by naturalists that there are only two known species of this genus in Africa—the Black Rhinoceros (*R. bicornis*) and the White Rhinoceros (*R. simus*). Of the Black Rhinoceros a fine series of horns has been figured by Mr. Selous (*l. s. c.*), showing the variations that exist in the comparative length of the anterior and posterior horns. The anterior horn of the Black Rhinoceros, though, save in very exceptional cases, always longer than the posterior horn, seldom reaches more than 24 inches in length, though occasionally longer<sup>1</sup>. On the other hand, the front horn of *R. simus* grows, as is well known, to an extraordinary length, varying from 18 to 48 inches, and reaching even 57 inches in abnormal specimens. This horn is, however, of great thickness at the base and much more compressed laterally than is the case with the specimens now in question, and in fact of quite a different character. Moreover *R. simus*, now almost extinct<sup>2</sup>, has never been known to occur north of the Zambesi. It is not possible, therefore, to refer Mr. Holmwood's specimens to *R. simus*. There remains the question whether they can belong to abnormal individuals of *R. bicornis*, to which form of *Rhinoceros* they would appear from general characters to be most nearly related. Before considering the question I will shortly describe the specimens.

*a* (fig. 1) is 42 inches in length from the base of the thickened pedicel along the curve to the top of the horn. The pedicel is nearly circular, about 5 inches across on its lower surface. It is rounded, not flattened in front. At about 5½ inches from the base the true horn emerges from the pedicel; here it is ovate in shape, about 2·5 from front to back and 2·1 from side to side. It is nearly straight at the base, but curved gently backwards in the last third of its length. It is very smooth and of a uniform dark brownish black in colour.

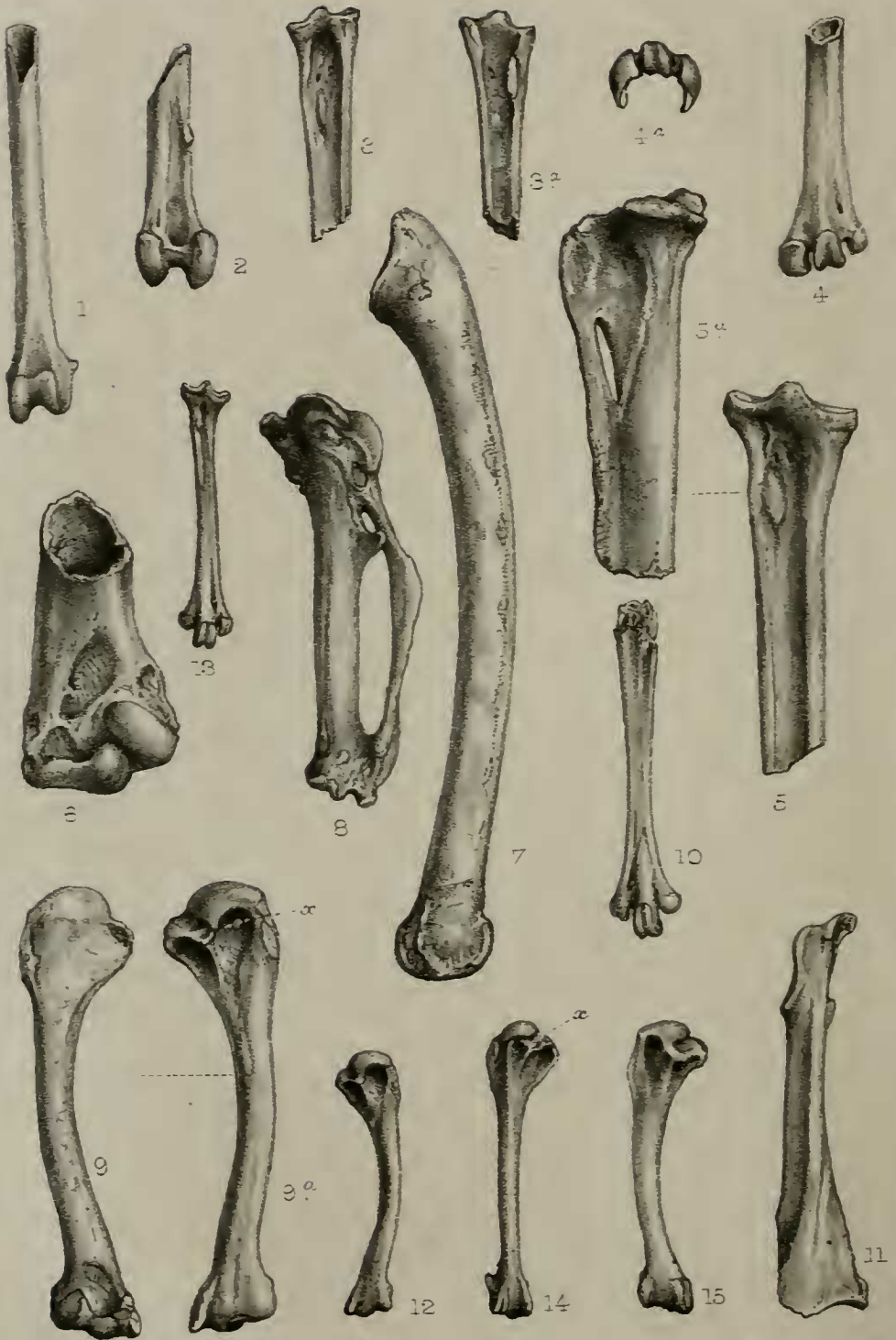
*b* (fig. 2) is generally similar, but not quite so long (41 inches), thicker at the base, where the horn emerges from the pedicel, and much more rapidly curved backwards. It is also much paler in colour.

On comparing these horns with anterior horns of the Black Rhinoceros (two pairs of which Mr. Selous has kindly lent me for the purpose), it will readily be seen that they are at once recog-

<sup>1</sup> There are two horns in the British Museum, referred to this species (1520 *h* and 1520 *i*), 42 and 40 inches in length respectively. See Hand-l. Edent. p. 52 (1873).

<sup>2</sup> A recent letter, addressed to the 'Field' by Mr. Selous (Field, vol. 80, p. 803, Nov. 26th, 1892), shows that the White Rhinoceros still exists in Northern Mashonaland, a herd of six having been met with by Messrs. Eyres and Coryndon about 100 miles N.W. of Salisbury.





Bergan & Highley del. & lith.

West Newman imp.

Bird-bones from Grive-St-Alban.

nizable by their great length, their thinness, and the small size of the pedicel.

I am told that these peculiar horns are well known as articles of trade at Zanzibar, where they are brought by the caravans from the interior. I do not propose to found a new species on them, because it is possible that they may be abnormal horns of the female Black Rhinoceros, which we know is found all through Eastern Africa up to the White Nile and plains of Upper Nubia<sup>1</sup>. But it is highly probable that they belong to a different animal, of which we may hope some day to receive perfect specimens. In the meantime they may be provisionally named Holmwood's Rhinoceros, *Rhinoceros bicornis holmwoodi*.

### 3. On some Bird-bones from the Miocene of Grive-St.-Alban, Department of Isère, France. By R. LYDEKKER.

[Received May 17, 1893.]

(Plate XLI.)

For the second time I am indebted to my friend Dr. C. J. Forsyth Major for the opportunity of adding something to our knowledge of the fossil birds of Europe—the small collection which he has on this occasion confided to my care having been obtained from the Miocene beds of Grive-St.-Alban, in the Isère. Those beds belong to the middle division of the Miocene period, and probably correspond approximately in age to those of Sansan in the Gers. So far as I am aware, the only bird-remains hitherto recorded from the Grive-St.-Alban deposits are a few described by Dr. C. Depéret<sup>2</sup>. These remains, which are but few in number, were regarded as indicating the existence of an undetermined Accipitrine of the size of the Common Buzzard; of a peculiar species of Woodpecker (*Picus gaudryi*); of a Pheasant, identified with a species (*Phasianus altus*) described by M. A. Milne-Edwards from the Sansan deposits; of a smaller representative of the same genus; of a Gallinaceous bird referred to the Lower Miocene genus *Palaeortyx*, under the name of *P. edwardsi*; of a Crane, provisionally identified with *Grus pentelici* of the Pikermi beds; and of an undetermined Anserine. The collection of specimens obtained by Dr. Forsyth Major is far more numerous, and contains several bones in a perfect state. Others, however, are very fragmentary and difficult of identification; and I have accordingly thought it well to refer in most cases only to such specimens as I have been able to identify with a fair amount of certainty. As I have had occasion to mention previously, our collections of Avian osteology are at present in such an unsatisfactory condition that the determination of complete (not to say

<sup>1</sup> See Baker, 'Nile-Tributaries,' p. 246 (1872).

<sup>2</sup> Arch. Mus. Lyon, vol. iv. pp. 282-288 (1887).

of imperfect) bones is frequently a matter of extreme difficulty, if not of actual impossibility.

*STRIX SANCTI-ALBANI*, n. sp. (Plate XLI. figs. 1-4.)

In the British Museum Catalogue of Fossil Birds I took the family *Strigidae* to include all the members of the nocturnal birds of prey, but I have since seen reason to adopt the subdivision of the group into the families *Strigidae* and *Bubonidae*. And I am the more confirmed in this latter view from the circumstance that the specimens under consideration show an osteological distinction between the members of those two families which I have not observed recorded in the works with which I am familiar.

Of all the birds represented in the collection the one of which the remains are most numerous is a species of Owl belonging to the genus *Strix*—no less than eleven more or less imperfect bones being referable to this form. From these specimens I have selected four for illustration (see Plate XLI.)—those represented in figures 1 and 2 being the distal portions of the right tibia, while those in figures 3 and 4 are respectively the proximal and distal halves of the left tarso-metatarsus. The Strigine affinities of these specimens are amply demonstrated by the form of the lower end of the tibia, in which the condyles are remarkably prominent, while there is no bridge over the extensor groove on the anterior aspect; and likewise by the highly convex arch formed by the distal trochleæ of the tarso-metatarsus, and the general form and prominence of the crest on the hinder part of the hypotarsus. Although I am not aware that any sharply defined distinction can be drawn between the tibia of the *Bubonidae* and *Strigidae*, I find that *Strix* differs from all the members of the former that I have been able to examine in the absence of the bony bridge over the extensor depression of the upper part of the anterior face of the tarso-metatarsus. As this bridge is wanting in the specimens before us (fig. 3), and as they agree otherwise in general form and size with the corresponding bones of the Barn-Owl, I opine that they must be referred to the genus *Strix*. Agreeing in size with the corresponding elements in *S. flammea*, they are distinguished by the grooves between the distal condyles of the tibia being somewhat less deep; while the tarso-metatarsus has a deeper posterior groove and a smaller crest to the hypotarsus. The only fossil representative of the genus which, so far as I am aware, has received a distinct name is *S. melitensis*<sup>1</sup>, founded on a femur from the Pleistocene of Malta, which differs from that of *S. flammea* in its more slender proportions. As there are no indications of a similar slenderness in the bones under consideration, I think I shall be justified in assigning them to a new species, under the name of *S. sancti-albani*. The specimens do not, however, admit of defining the species more exactly than by the above-mentioned features in which it differs from *S. flammea*.

<sup>1</sup> Lydekker, Cat. Foss. Birds Brit. Mus. p. 13 (1891).

*PHASIANUS ALTUS*, Milne-Edwards. (Plate XLI. figs. 5-8.)

As already mentioned, Dr. Depéret has referred to this species certain remains from St. Alban, and four specimens in the present collection seem to fully justify this determination. The bones on which this species was originally founded were but very imperfect, and our knowledge of its osteology was advanced by those described by Dr. Depéret, which included the lower end of the tibia, the upper extremity of the tarso-metatarsus, a part of the upper end of the femur, and some fragments of the metacarpus. The specimens in the present collection comprise the proximal part of the left tarso-metatarsus (Plate XLI. figs. 5, 5 *a*), the distal end of the left humerus (fig. 6), the entire left ulna (fig. 7), and the complete left metacarpus (fig. 8). From their all pertaining to the left side it seems not improbable that all the four are portions of a single bird.

These bones agree with those previously described in indicating a bird of considerably larger size than the Common Pheasant, being in fact intermediate in size between that species and the Peacock. They also decisively confirm the reference of the species to the genus to which it is assigned<sup>1</sup>. For instance the intermetacarpal bar of the metacarpus (which of itself sufficiently indicates the gallinaceous nature of that bone) is far smaller than in *Pavo*, and comes nearest in this respect to *Phasianus*; while the proximal part of the tarso-metatarsus has the same narrow shape as in the latter, with a deeper groove and one more ridge on its posterior surface than in *Pavo*. Other characteristic features of *Phasianus* are the single and prominent tubercle for the insertion of the tibialis anticus, the opening of the two superior perforations on the same horizontal line, the large size of the tibial cups and the comparatively small tubercle between them, and also the single tube and two shallow grooves in the hypotarsus. The diameter of the proximal extremity of this specimen is 0,017 mm., against 0,016 mm. in the one described by Dr. Depéret; while both in his and the present specimen of the metacarpus the diameter of the proximal extremity is 0,015. Beyond stating that the length of the ulna is 0,094 mm., while the transverse diameter of the distal end of the humerus is 0,0205 mm., the other specimens do not call for further mention.

*PALÆORTYX EDWARDSI*, Depéret. (Plate XLI. figs. 9, 10.)

The Gallinaceous birds from the Upper Eocene of Paris and the Lower Miocene of the Allier described by M. Milne-Edwards under the name of *Palæortyx* are easily recognized, among other characteristics, by the large size of the tricipital fossa of the humerus, which extends for a considerable distance under the head. In this feature these birds resemble to a certain extent the living

<sup>1</sup> I may mention that, as is frequently my custom, I determined the genus of these bones before referring to the description of the birds previously recorded from the formation whence they were obtained.

*Ammoperdix*, *Ortyx*, and *Coturnix*, while they are totally different from *Caccabis*, *Perdix*, *Phasianus*, and most other members of the group. Probably the extinct *Palaeoperdix*, of the Sansan beds, had a similar type of humerus, but the tarso-metatarsus is of a less flattened type. To the genus *Palaeortyx*, Dr. Depéret has referred two imperfect humeri from Grive-St.-Alban, with which a complete specimen in the present collection agrees; and as the associated specimens of the tarso-metatarsus appear to present the characters distinctive of that genus, I am disposed to accept his determination.

The right humerus (represented in figs. 9, 9a of Plate XLI.) agrees precisely with the distal half of the corresponding bone figured by Dr. Depéret in pl. xiii. fig. 51 of vol. iv. of the Arch. Mus. Lyon, as one of the types of *Palaeortyx edwardsi*; while its proximal portion appears to correspond with that portion of another right humerus depicted in fig. 52 of the above-cited plate. In total length the humerus here figured measures 0,055 mm., or somewhat more than the corresponding bone of *P. blanchardi*, Milne-Edwards, from the Allier Miocene, in which the length is 0,047. According to Dr. Depéret the humerus of *P. edwardsi* differs from that of the last-named species not only in its superior size, but likewise in the absence of a distinct prominence on the outer side of the head. Compared with the corresponding bones of *Ammoperdix* and *Ortyx*, the present specimen, although much larger, is generally very similar, although there are certain differences which are evidently of generic value. The large size of the tricipital fossa differentiates the specimen from the existing Oriental *Cryptonyx*, and the extinct *Palaeocryptonyx* from the Pliocene of Roussillon<sup>1</sup>.

The right tarso-metatarsus (represented in fig. 10), of which the proximal extremity is imperfect, is evidently that of a partridge-like gallinaceous bird, and as it agrees approximately in relative size with the humerus, it may be tentatively assigned to the same distinctive species. Since it appears to present all the characters of *Palaeortyx* rather than of *Palaeoperdix*<sup>2</sup>, it confirms Dr. Depéret's reference of the species under consideration to the former rather than to the latter genus.

#### PALAEORTYX MAXIMA, n. sp. (Plate XLI. fig. 11.)

The slightly imperfect right coracoid of a gallinaceous bird (represented in fig. 11), being of too large dimensions to have belonged to the same species as the humerus above mentioned<sup>3</sup>, while it agrees in all essential characters with the corresponding bone of *Palaeortyx*, *Ammoperdix*, and *Ortyx*, may be taken to indicate a second species of the first-named genus, distinguished from all the others by its superior size. The length of this coracoid

<sup>1</sup> Depéret, Comptes Rendus, vol. cxiv. p. 691 (1892).

<sup>2</sup> See Cat. Foss. Birds Brit. Mus. p. 137.

<sup>3</sup> In *P. gallica*, of which the humerus measures 0,042, or 0,005 less than the corresponding bone of *P. blanchardi*, the length of the assigned coracoid is only 0,025.

is upwards of 0,050 mm.; and this must for the present serve as the distinctive feature of this species.

*PALÆORTYX GRIVENSIS*, n. sp. (Plate XLI. fig. 12.)

The right humerus (represented in fig. 12) indicates a species of the size of the Common Quail, and somewhat inferior in this respect to *P. brevipes*, which is the smallest of the Allier representatives of the genus. Thus, whereas in the present specimen the length is 0,0337 mm., in the corresponding bone of *P. brevipes* it is 0,0357 mm. On account of this inferiority of size, coupled with its much higher geological horizon, I am disposed to regard the present specimen as indicating a distinct species, which I assign to *Palæortyx*, with the name of *P. grivensis*. Compared with the nearly equal-sized humerus of *Coturnix*, this specimen exhibits very clearly the distinctive features between the two genera. Thus whereas in the Quail the subtrochanteric fossa is much larger than the shallow tricipital fossa, and extends beneath it, in *Palæortyx* the latter is much the larger of the two, and is of such a depth as to prevent the former from extending beneath it towards the outer side of the bone.

*PALÆORTYX*, sp. inc. (Plate XLI. fig. 13.)

Seeing that in the Common Quail the humerus is of almost exactly the same length as the corresponding bone of *P. grivensis*, while the tarso-metatarsus measures only 0,027 mm. in length, it would seem impossible that the tarso-metatarsus now exhibited (see fig. 13), of which the length is 0,032 mm., can belong to the species last named. I accordingly regard it as probably indicating yet another species of the genus from La Grive, nearly of the same size as *P. brevipes* of Allier, but to which I do not consider it advisable to assign a distinct name. In its comparative flatness, as well as in the straightness of the hypotarsus and the depth of the external posterior groove, this bone exhibits all the features characteristic of *Palæortyx* as distinct from *Palæoperdix*.

*TOTANUS MAJORI*, n. sp. (Plate XLI. fig. 14.)

From the presence of a distinct triangular ectepicondylar process, the small left humerus (represented in fig. 14) is clearly referable to the *Gaviæ*, *Limicolæ*, or *Tubinares*. From the corresponding bone of the more typical *Laridæ* it is readily distinguished by the smaller size of the tricipital fossa; while it differs from that of *Sterna* in the larger size of the ectepicondylar process. Compared with a skeleton of the Yellow-footed Sandpiper (*Totanus flavipes*), it is found to agree so closely with the humerus that there can be little hesitation in referring it to a member of the same genus. The total length is 0,037 mm., or about one-fourth less than that of the corresponding bone of the species above-named. A small species of *Totanus* from the Allier Miocene has been named *T. lartetianus* by Milne-Edwards; but as the higher geological

horizon of the present specimen may be taken as an almost certain indication of its distinctness from that form, I propose to regard it as representing a new species, under the name of *T. majori*. In the absence of a specimen of the humerus of *T. lartetianus* available for comparison, I am, however, unable to point out the distinctive differences of the present bone.

#### UNDETERMINED SPECIMENS.

Among the undetermined specimens there are several complete bones undoubtedly referable to small Passerines, although the materials available to me do not admit of any satisfactory attempts at their generic discrimination. In figure 15 of Plate XLI. I have, however, figured a left humerus which may be Picarian, in the hope that some one better acquainted with the osteology of these groups of birds may be able to determine its affinities.

#### EXPLANATION OF PLATE XLI.

- Fig. 1. *Strix sancti-albani*. Back view of distal half of the right tibia.  
 2. *Strix sancti-albani*. Front view of the distal portion of the right tibia.  
 3, 3a. *Strix sancti-albani*. Front and back views of proximal half of the left tarso-metatarsus.  
 4, 4a. *Strix sancti-albani*. Front and lower views of the distal portion of the left tarso-metatarsus.  
 5, 5a. *Phasianus altus*. Anterior and inner aspects of proximal portion of the left tarso-metatarsus.  
 6. *Phasianus altus*. Palmar aspect of distal extremity of the left humerus.  
 7. *Phasianus altus*. The left ulna.  
 8. *Phasianus altus*. The left metacarpus.  
 9, 9a. *Palæortyx edwardsi*. Palmar and posterior aspects of right humerus. x, tricipital fossa.  
 10. *Palæortyx edwardsi*. Anterior aspect of the imperfect right tarso-metatarsus.  
 11. *Palæortyx maxima*. Anterior aspect of the slightly imperfect right coracoid.  
 12. *Palæortyx grivensis*. Posterior aspect of the right humerus.  
 13. *Palæortyx*, sp. inc. Front view of the left tarso-metatarsus.  
 14. *Totanus majori*. Posterior aspect of the left humerus. x, tricipital fossa.  
 15. Posterior aspect of the left humerus of an undetermined (? Picarian) bird.

All the specimens were obtained from the Middle Miocene of Grive-St.-Alban, and are drawn of the natural size.

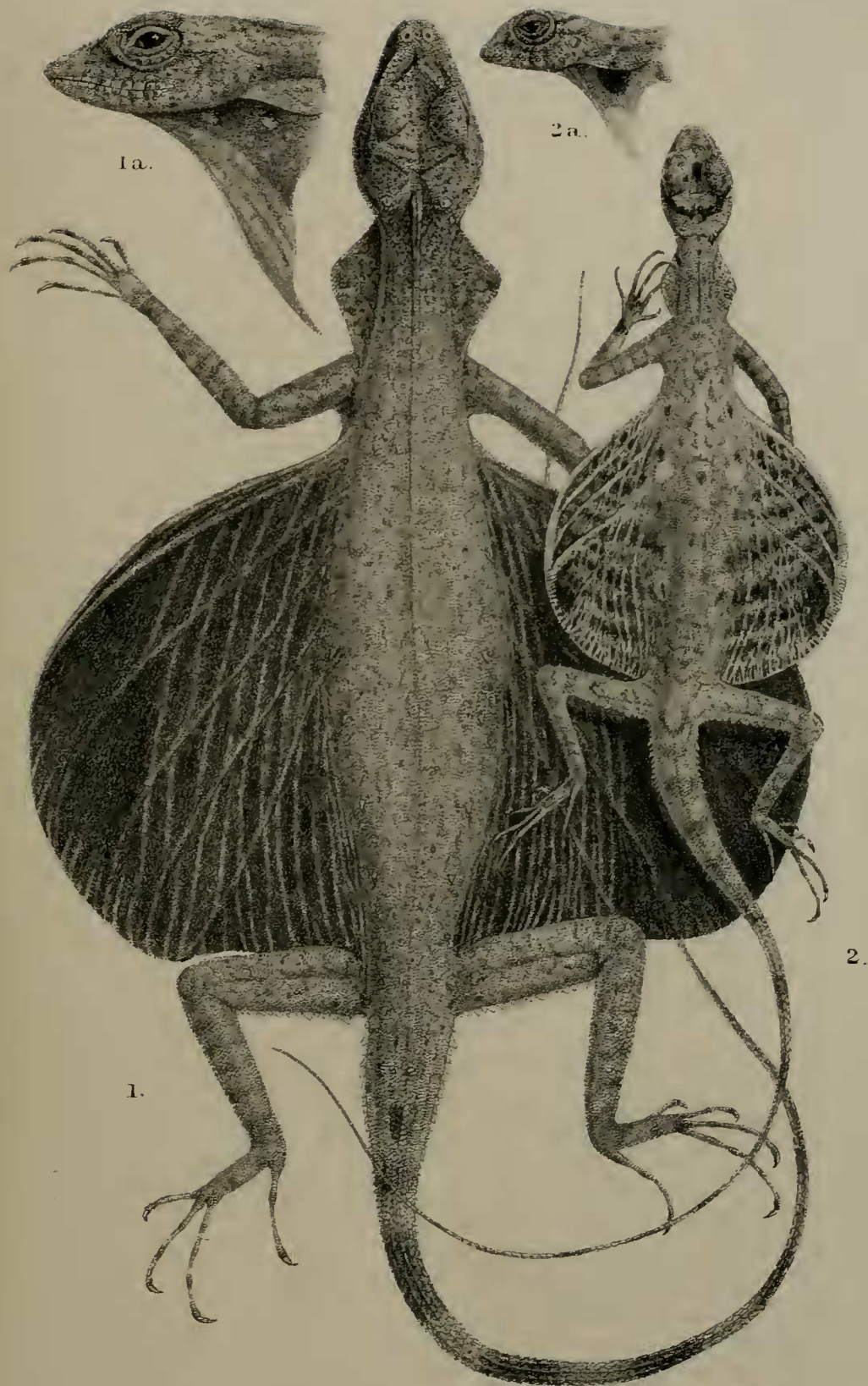
4. Descriptions of new Reptiles and Batrachians obtained in Borneo by Mr. A. Everett and Mr. C. Hose. By G. A. BOULENGER.

[Received June 2, 1893.]

(Plates XLII.-XLIV.)

DRACO MAXIMUS. (Plate XLII. fig. 1.)

Head small; snout as long as the diameter of the orbit; nostril directed upwards, perfectly vertical; tympanum covered with



1.

2.

